

The Federal Republic of Germany  
German patent-office

-1-

**Publication 1801161**

File No. P 18 01 161.5

Date of register : 4<sup>th</sup> October 1968

Date of publication: 16<sup>th</sup> April 1970

Name : Filter, especially for internal-combustion machines

Registered by: Purolator Filter GmbH, 7110 Öhringen

Named as inventor: Weik, Hans, 7000 Stuttgart

Notification according Art. 7 & 1 § 2 No.1 law of 4.9.1967 (BGBl.I.S.960):

Page 1

Dr. HANS KARL HACH

6950 Mosbach

Patent-lawyer

24<sup>th</sup> September 1968

P 15 013

PUROLATOR Filter GmbH, 711 Öhringen, Postfach 91

---

Filter, especially for internal-combustion machines in motor vehicles.

---

The invention concerned a filter, especially for internal combustion machines in motor vehicles with several coaxial ring-formed filtercharges with ring-formed intermediate space which is arranged around each other, which are in parallelcircuit with their raw side on a common accession for the filtermedium and with the clean side connected to the common housing, and such filter, which is used to filter the sucking air of airsucking machines, which are used to

filter lubricants, e.g. lubricating oil , and the liquid fuel, e.g. petrol and diesel oil by motor vehicles.

The filter medium could be a gas or a liquid.

By a well-known air sucking filter of this kind, DAS 1 273 901, 5 filter charges are provided, which are all being streamed from in- to the outside.

Between two neighbouring filter charges, a ring-formed, unpermeable stream leading element is arranged that divides the mentioned intermediate space in its whole axial length.

## Page 2

This separation is necessary, so that the radial from the outside to the inside streamed filter-insertions could be switched parallel.

By this multiple filter the sucked air streamed from outside against the most external filter charge and gets in intensive touch with the housing wall. This leads to unpleasant stream noises. The sucking air also streams with somewhat high stream resistance along the mentioned stream leading elements, which has metal touch with the housing. This also caused streaming noises and it disturbs if there are no extinguisher.

Along the streaming-elements the ring-formed intermediate space is divided into two streaming canals, which are very narrow and would need a very high streaming resistance.

Task of the invention is to create such a filter, that by a simple and narrow structure, the flow of streaming would be free of resistance, with the result, that the streaming noises which will reach the housing will be avoided as much as possible.

The invention is so characterized that an even number of filter charges will be provided and that always two neighbouring filter charges with their raw sides

are turned to each other, and are connected to the accession of the filtermedium. The filtermedium is streaming through the most external filtercharge radial from the inside out, will reach the housing wall after it is extinguished in the most external filtercharge. So the noises will be reduced.

Page 3-

Because of the two raw sides turned to each other in pairs, the stream of the raw gas could stream through the ring-formed intermediate space freely. This counts also for more than two filtercharges, also for the others through raw air sides bounded by ring-formed intermediate space.

Supposing the same measures, the total cross sections for the influx in these intermediate spaces are not bigger as by the well-known gas filter, but the single streaming cross sections is bigger and because of this the streaming will be encouraged. Because the streaming leading-elements are not necessary according to the invention, the streaming noises would also be avoided.

The provided ring-formed intermediate spaces for the influx of the raw medium must be separated from the clean sides according to the invention, and this could be made simply through the appropriate continuous construction, of which its characteristics are, that one of both raw sides turned to each other of two neighbouring filtercharges bounded by a ring-formed intermediate space on its first axial end are covered by its coping and on its second axial end is open for the accession of the filtermedium.

This coping could be united with the charges for the necessary support, as that the first axial ends of the front sides of both filtercharges are situated on one level, in which also lay the coping, which is part of the support ring, which braced and covered both frontsides.

If it concerned filtercharges which have the same axial length, the front sides at the second axial end are also situated on one level and only one support ring could be provided.

#### Page 4

For the access of the medium it would be sufficient to provide breaches in the area of the ringformed intermediate space.

A continuous structure of the invention is marked by its simple construction and is characterized that only two filtercharges are arranged in a coaxial cylinder-formed, from a housing bottom with a coping, arranged with the two front sides at the second axial end facing the bottom, and that at the bottom are placed access-openings for the access of the filtermedium and a central exit-opening for the filtermedium, that the support ring at the second axial end from outside to the edge of the cap and at the inside to a central sealing of the exit opening for the filtermedium with the inner edge of the inside of the filtercharge is connected with the exit supports, that the support ring on the first axial end in and outside linked with the clean sides of the filtercharge, and that the cap surrounds both filtercharges outside and at the first axial end with a certain distance.

It is recommended to provide filtercharges with several axial lengths.

This is made practical, by having the inside of both filtercharges with a bigger axial length as the outside and that the access for the filtermedium has bigger radial distance to the axle of the filtercharge as the ring-formed intermediate space. The invention which is characterized by its simple structure, that only two filtercharges in a coaxial cylinderformed cap with a bottom in the housing, are arranged with the second axial end with its front side turned to

each other, that at the second axial end the inside of the filtercharge is covered with a pane,

Page 5

locked with the raw side of the filtercharge and propped on the bottom, that the end of the second axial frontside of the outer filtercharge is propped on an external ring area of the bottom, which covered the clean side of the filtercharge against the raw side sealed on the frontside, that the support ring on the first axial end inside and outside of the filtercharge is locked with the clean side of the filtercharge, that this support ring is propped over coaxial breaches on the propped ring and is propped against the cap and that in the center of the cap an exit opening for the filtermedium is provided.

By this kind of filtering, esp. on fuel and lubricating filter, filtering is made in a main and tributary stream,

by which the main and the tributing stream are switched parallel.

Rough filtering is done in the main stream, and fine filtering is done in the tributary stream. As the filtermedium is constantly rotating, in several rotations the fine particles will also be filtered, so the rough particles will not block the tributary stream, as it would be when the whole filtering is made only for the fine particles.

Such kind of filtering could be made very simple with the invented filter, which bear its characteristics, that one filtercharge of two filters are turned to each other with its raw sides, of which the other is rough and the other is fine.

The filtering collects dust and suspended particles on the raw side of the filters.

These particles could sink , at least a part of it, if according to the structure of the invention, two with the raw sides turned to each other are arranged bending

to the lower side and lead the raw medium from below into the gap between the intermediate space.

#### Page 6

By this self-cleaning effect, a special advantage could be achieved, because the ring-formed intermediate space in the stream direction of the raw filtermedium are narrowing in cross-section,

as at the same time the streaming volumes diminished because of loss of stream at the side of the filtercharges, in compliance with the streaming of the cross section of the intermediate space in the streaming-direction reducing its requirement.

This solution will cause a place-saving construction.

The invention will now be described according to the drawing.

The drawing shows:

Illustration 1: a first example of the operation of an oil filter according to the invention in intersection.

Illustration 2: an example of the operation of an air sucking filter according to the Invention, also in intersection.

Illustration 3: an altered arrangement of the filtercharges.

According to illustration 1, signified with 1 and 2 two ring-formed filtercharges, which are arranged in rotation symmetric to the axle 3.

The diameter of filtercharge 2 is much bigger than 1, that a ring-formed intermediate space 4 between both filtercharges stayed free, which is covered by a support ring 5, which covers both filtercharges above, and are closed airtight.

Both filtercharges 1 + 2 are in axial direction of the same height and are so arranged that front sides are lying on one level.

Page 7

Both filtercharges are fastened to a second support ring 6, which in intermediate space 4 are divided to the whole perimeter and shows several breaches 7.

Support ring 7 fastens both filtercharges 1 +2 and reaches with its outer edge to the inner edge of cap 8 of the housing, where it lays close by an intermediate circuit of a caulking ring 9.

A jolt pipe 10 is inserted in the middle of the support ring 6, which produces a stream connection between intermediate space 11 of the inner filtercharge 1 and an exit socket 12, which is the central part of the housing bottom 13.

The housing bottom 13, which is not closed and breach 14,15, which showed several invisible breaches, is feathered and on one hand is propped under tension at the free edge of cap 8 turned over the edge ring and on the other hand on the jolt 10, so that jolt 10 is pressed against the support ring 7, and support ring 7, in return, is pressed against a grade 16 of cap 8. The jolt pipe 10 shows shunt drills 16 on the outside, which are closed by means of a compression spring burdened by valve lid 18.

These shunt drills, together with the valve lid 18 and compression spring are building a security valve which caused a short circuit by choking filtercharges of the filter.

Upon operation, the cleaning medium streams, e.g. lubricating oil, through the breaches 14,15 and breach 7 in the intermediate space 4, and from there radial to the in- and outside through filtercharge 1 and 2, are being cleaned. The cleaned medium of the filtercharge reaches the inner space 11 immediately, while the cleaned medium out of filtercharge 2, streams along support ring 5, and reach the intermediate space 11.

Page 8

From there the cleaned medium leaves the filter through joint pipe 10 and the exit socket 12.

Illustration 2 describes an air sucking filter, which shows two ring-formed filtercharges 30,31

which are arranged around each other coaxial to the axle 32 and are so constructed that an intermediate space 33 stayed inbetween.

The filtercharge 31, has a bigger axial length and exceeds the filtercharge 30, as showed in illustration 2,

on the other side, the front parts of both filtercharges 30 and 31 are on one level and fastened to support ring 34, which sealed the intermediate space on this side.

The support ring 34 is propped by a perforated propped ring 35, propped at cap 36 and fastened.

On the other side lays a propped pane 37 to the inside of filtercharge 31, which is propped to projection 38 of the housing bottom and sealed the inner space 40 of the filtercharge 31.

The filtercharge 30 is propped by an intermediate circuit of the cover ring 41 at the housing bottom 39, which is turned over the edge.

The housing bottom 39 is bend out to the ring canal 42.

In this ring canal is a conductor 43 for the filtered medium, and with a bigger radial distance to axle 32 as the intermediate space 33.

45 is marked for a discharge prop for the cleaned medium, which lays central of cap 36 and is within the propped ring 35.

With the exception of conductor 43, all described parts are arranged in rotation symmetric axle 32.



Page 9

On operation, the medium streams through conductor 43 into the ring space 42, and from here to the intermediate space 33, from there the medium is partly carried through the the filtercharge 30, on the other hand to the filtercharge 31 in radial direction according to the marked arrows, and will be cleaned or filtered. From filtercharge 31; the medium reaches the propped discharge 45 over the inner space 40.

From the filtercharge 30 the cleaned medium reaches over a free ring space 46 between the clean sides of the filter charge and the cap 36 to the propped ring 35, which is carried through the perforation, and will also flow through the propped discharge.

On both examples of the operation, the raw medium of the intermediate space 4 or 33 reaches both filtercharges 1, 2 or 30, 31.

The raw sides through which the raw and uncleaned medium are streaming, are caused by the leading stream, turned to each other and the cleaned side, those are the sides from which the cleaned medium leaves the filtercharge, are turned off from each other.

If both examples are being operated in the upright position, that the raw medium streamed from below into the intermediate space 4 or 33, it could result into a self-cleaning effect, because the dust particles, which is collected on the raw sides of the filtercharges, could fall down. This self-cleaning effect could be encouraged, if the filtercharge is arranged with their raw sides bended to each other.

The result is, that the raw sides lays in the coat surface of a circle cone, as showed in ill. 3, in which only the filtercharge 50 + 51 are turned to each other, so that the conic construction could be seen better, and is showed perspectively. The stream is indicated by the arrows. A such changed operation example could be constructed just like illustration 1, by which only the measures of the single parts, esp. which are holding the support rings 5 and 7 are changed.

Page 10

24. September 1968

P 15 013

**Pretensions**

1. Filter, especially for internal combustion machines in motor vehicles with several coaxial with ring-formed intermediate space turned around each other with the arranged ring-formed filtercharges with their raw sides connected to a common accession for the filtermedium and with their clean sides to a common exit for the filtermedium of their common housing, are being characterized, that an even number of filtercharges (1,2) is provided, and that always two neighbouring filtercharges (1,2) with their raw sides turned to each other to the accession (7,15) for the filtermedium are connected.
2. Filter according to Pretension 1, is being characterized, that the raw sides of two neighbouring filtercharges (1,2) turned to each other covered by a defined ring-formed intermediate space (4) on its first axial end covered by a coping (5) and open at the second axial end for the accession of the filtermedium.
3. Filter according to Pretension 2, is being characterized, that the first axial end of which the frontlines of both filtercharges (1,2) are lying on one level, in which is also situated coping (5), which is part of a support ring, are propping and covering both frontlines.
4. Filter according to Pretension 2 and/or 3, is being characterized, that on the second axial end of which the frontlines of both filtercharges (1,2) are lying on one level covered and propped by a common support ring (6), which shows

breaches(7) in the area of the ring-formed intermediate space(4).

5. Filter according to pretension 2 and/or 3, is being characterized, that the inside of both filtercharges has bigger axial lengths than the outer sides, and that the accession (43) for the filtermedium has a bigger radial distance to the axle of the filtercharges than the ring-formed intermediate space (33).
6. Filter according to Pretension 1 to 4, is being characterized, that only two filtercharges (1,2) in one coaxial cylinder-formed housing (8,13), consists of a cap(8) with a bottom (13), with the second axial end situated frontlines of the bottom (13) turned to each other, and that on the bottom(13) accession openings (15) for the accession of the filtermedium and a central exit opening (12) is provided for the filtermedium, that the support ring (6) at the second axial end from the outside till the edge of the cap, and inside to the center, caulking the exit opening for the filtermedium with the inside edge of the inside filtercharge connecting exit sockets(10) , that the support ring (5) on the first axial end in- and outside with the clean sides of the filtercharges (1,2) are closed and that the cap (8) encircles both the filtercharges on the outside and the first axial end with some distance.
7. Filter according to Pretension 1,2,3 and 5, is being characterized, that only two filtercharges (30, 31) in one coaxial cylinder-formed, out of a bottom(39) closed cap (36) existing housing (36, 39) , arranged with the second axial end frontlines of this bottom (39) turned to each other, that on the second axial end, the inside filtercharge is covered by a pane (37), which is closed to the raw side of this filtercharge and are propped on the bottom, that the second axial end on the frontline of the outside of the filtercharge is propped to the outside of the ring area of the bottom, which sealed the clean side against the raw side of this filtercharge, that the support ring (34) on the

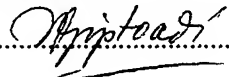
first axial end in the in- and outside is closed the clean sides of the filtercharge, that this support ring is propped over a coaxial, showing breaches at the propped ring(35) propped against the cap(36) and that in the center of the cap an exit opening(45)for the filtermedium is provided.

8. Filter according to one or several points of the previous pretensions, is being characterized, that one filtercharge of two with their raw sides turned to each other of the arranged filtercharges is rough and the other is fine.
9. Filter according to one or several points of the previous pretensions, is being characterized, that two with their raw sides against another of the neighbouring filtercharges with their raw sides turned against each other are arranged bending below , and that the lower end of the intermediate space between these filtercharges are connected to the accession opening of the filtermedium.

---

Free translation into english by Ineke Tjiptoadi (German Consulate in Surabaya) from the German language Offenlegungsschrift 1801161 in fotocopy.

This translation is made most conscientiously and no queries or check-backing with the translator is possible.


02. April 2002 ..... 

Diterjemahkan ke dalam bahasa Inggris oleh Ineke Tjiptoadi (Konsulat Jerman, Surabaya) dari fotokopi naskah bahasa Jerman Offenlegungsschrift 1801161 .

Terjemahan ini dibuat dengan penuh pengetahuan dan kesadaran penterjemah dan segala rechecking atau pertanyaan ulang mengenai terjemahan diatas tidak mungkin lagi.

Acknowledged and agreed :  
Mengetahui dan menyetujui:

Surabaya, 03 April 2002

  
.....  
ady. G

Tanda tangan dan nama terang  
PT Fuboru Indonesia

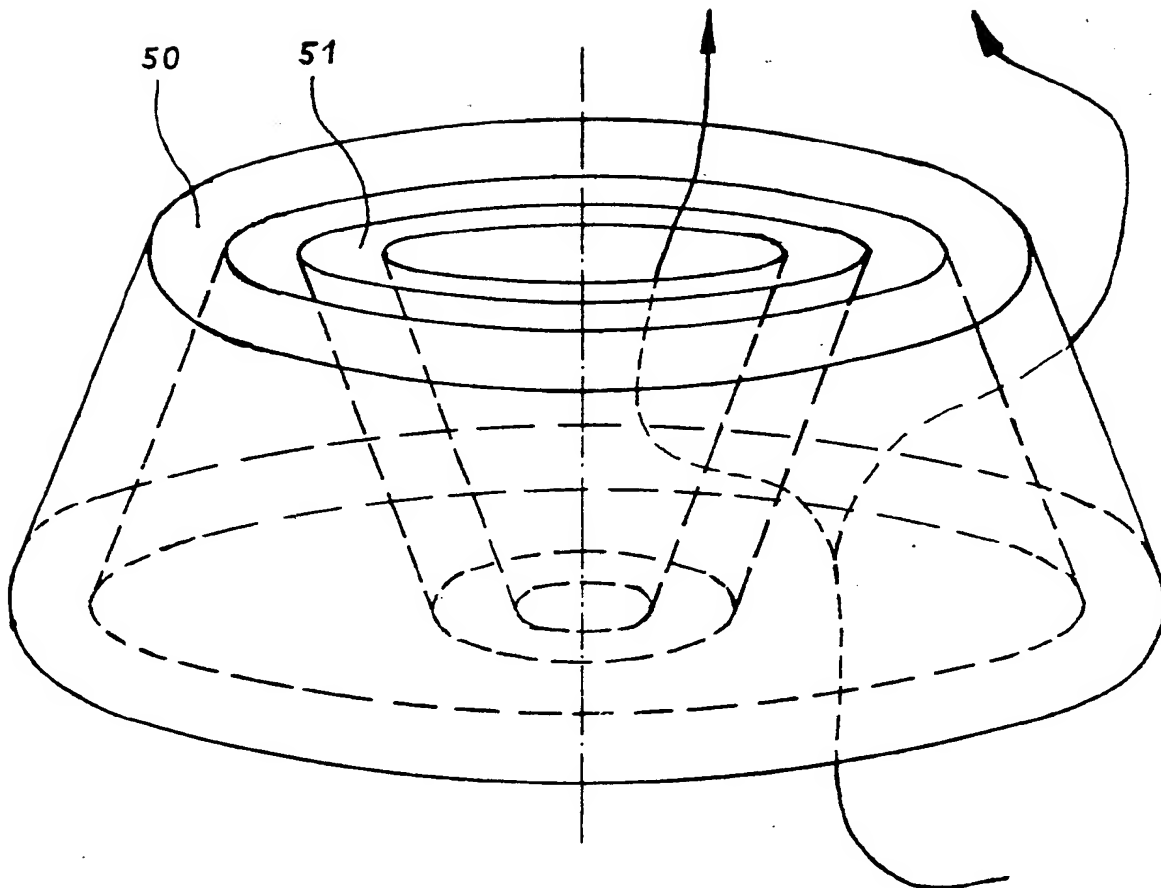


Fig. 3

1801161

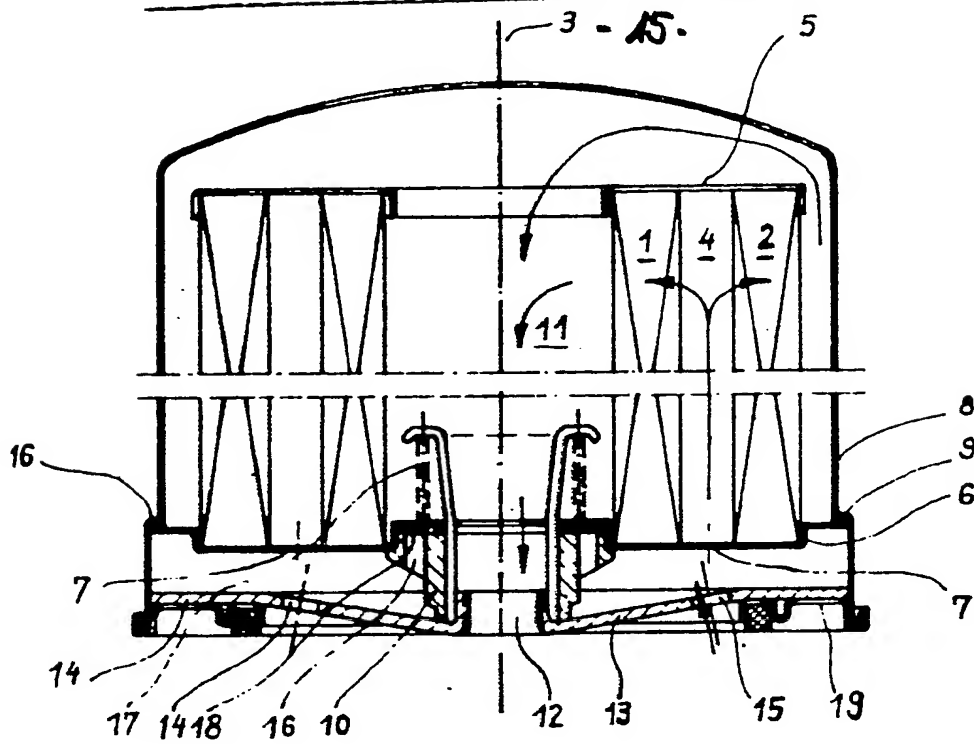


Fig. 1

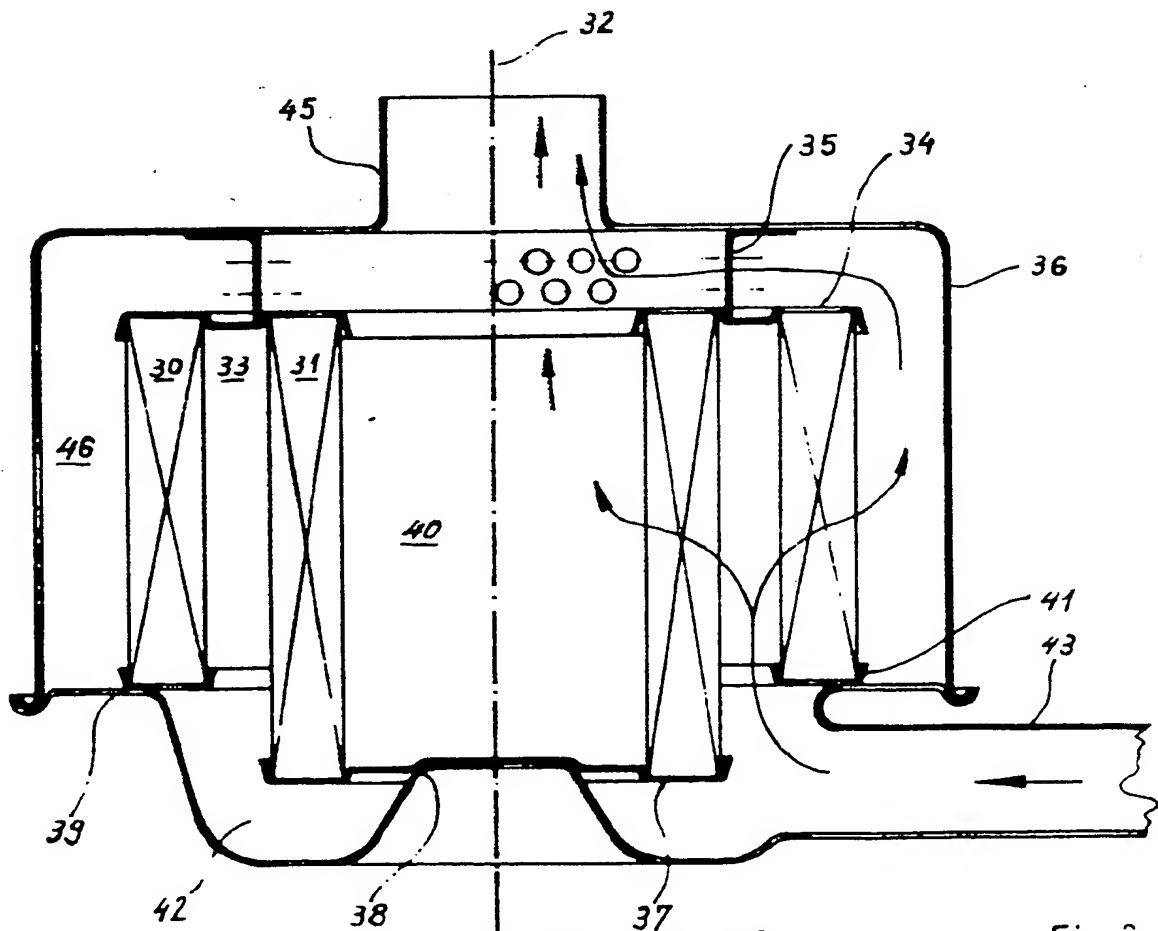


Fig. 2

009816/1129